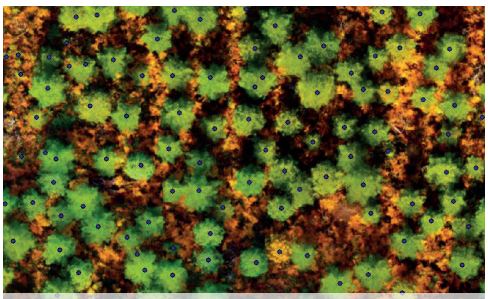
FPInnovations

DRONES: FEATURES VERSUS PRICE

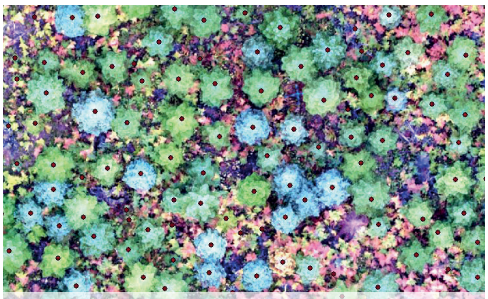
BY ANNE LEBRUN RUFF, R.P.F., UNDER THE SCIENTIFIC DIRECTION OF UDAYA VEPAKOMMA, RESEARCHER, FIBRE SUPPLY, FPINNOVATIONS

In recent years, when high-resolution and low-altitude imaging of forests is needed for surveillance, inventorying or continuous monitoring, the tool of choice is an unmanned aerial system (UAS), commonly known as a drone. Especially useful are vertical take-off and landing (VTOL) systems, which can take off and land vertically, and which can provide detailed information in confined or hard-to-reach areas. However, when it comes to forest operational needs, one question is frequently asked: Do the added advantages of high-end systems justify their cost ($60,000), or do low-end systems ($6,000 plus a tablet) provide similar or acceptable output?



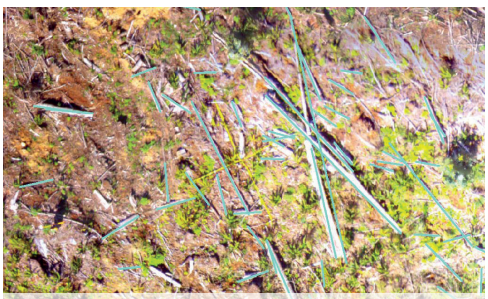
High-end System at 60m AGL

To understand the efficiency gains of the two systems in currently available specifications, FPInnovations conducted empirical trials in the Sayward Forest, near Campbell River, B.C., from September to October 2017. Two typical scenarios in operational forestry were considered: (i) identifying and estimating dimensions of post-harvested dispersed logs (in 2D) and (ii) estimating ground elevation and stem height as inputs to determine free-growing status of a regenerating stand (in 3D). The two systems were flown at two different altitudes above ground level (60 and 90 m) for both scenarios. Consistency in data acquisition and processing was ensured across all datasets to minimize artefacts. Extensive ground survey data were used to measure the level of accuracy and validation at every step.



Low-end system at 60m AGL

A generic cost analysis indicated that, while the purchase price of the high-end system was significantly higher than the lower-end one, the high-end system offered operational advantages such as longer battery life, slightly faster flight speed and stability during acquisition and a more reliable flight mission. To maintain the accuracy of the end results, the low-end system had to be flown with much higher overlap which increased the number of images and resulted in longer pauses during image gathering. This increased the acquisition time for 2D requirements by 20% and for 3D requirements by 50%. Furthermore, a 20% increase in data handling in 3D analysis was needed to accommodate the additional image acquisition from the low-end system.



High-end system at 60m AGL

However, the overall cost ($/ha) of a project favours a low-end system. A low-end system costs 10% less for 2D analysis, but costs 10% more for 3D analysis than a high-end system. In applications where accuracy is not of much concern, a low-cost UAS should be suitable for mapping. Alternatively, one can substitute a better camera on a low-cost UAS to improve the results to some extent. However, stability and mission control will remain an issue due to dependency on third-party software. Mostly because of their lower capital costs, the industry will tend to favour the low-end systems.

Low-end system at 60m AGL